MATHEMATICS CONTENT MODULES

Module 1: Setting the foundation for implementing the Tier 1 curriculum

Grades 6–9

The goal of the initiative

Chad Baker/Jason Reed/Ryan McVay/Photodisc/Thinkstock

Improve the quality of instruction in math classrooms by developing deep mathematical content knowledge of teachers and connecting that content knowledge to the practical implementation of a quality curriculum.

Math Content Module 1
Grades 6–9

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Group norms

- Understand that those who work, learn.
- Look for solutions, not blame.
- Focus on systems, not people.
- Recognize that everyone has expertise.
- Be honest.
- Challenge ideas.
- Share talk time.
- Mistakes are expected, respected, and inspected.

(Boaler, n.d.)

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Module 1 goals

Participants will…

- Examine the project overview and intended outcomes for content modules.
- Identify evidence of the key shifts in the standards and how these key shifts guide decisions about teaching and learning in conjunction with the EngageNY resources.
- Gain clarity on how the key shifts manifest in the EngageNY curriculum when executed well in instruction.
- Investigate the impact of educators' beliefs on their interactions with students and how those beliefs can influence student success in mathematics.

Math Content Module 1
Grades 6–9

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MATHEMATICS CONTENT MODULES

Module 1: Setting the foundation for implementing the curriculum

Session 1: Rigor of the LSSM

Grades 6–9

"Ultimately, college and career readiness demands students know more than just content, but demonstrate that they know how to learn and build upon that content to solve problems. They must develop versatile communication skills, work collaboratively and work competitively in a school or work environment."

(Office of the State Superintendent, n.d.)

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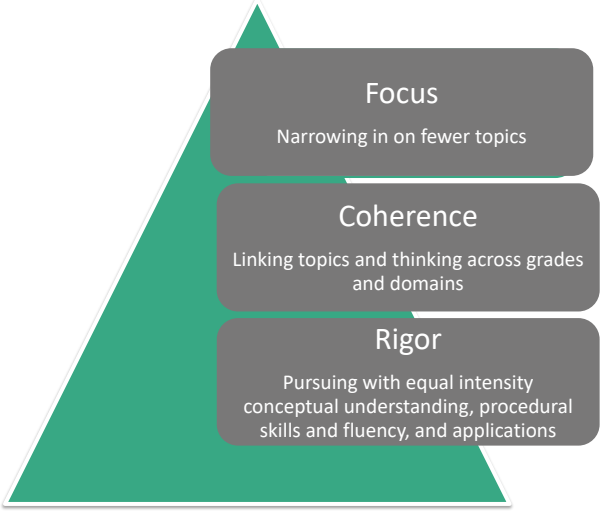
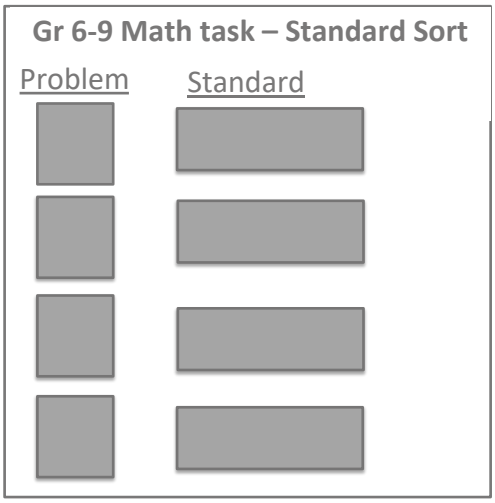
Key shifts of the LSSM

Save the Last Word for Me



Looking at the content



With your group:

- Match the task to the grade-level/course standard.
- Create a poster as shown.
- Be prepared to justify your reasoning.

Key shifts

Rigor

Pursuing with equal intensity
conceptual understanding, procedural skills
and fluency, and applications

Identifying the components of rigor

Gr 6-9 Math Task – Standard Sort

Problem	Standard	Component of Rigor
		Conceptual understanding because...
		_____ because...
		_____ because...
		_____ because...

On your poster:

- Identify the component of rigor that is evident in the task.
- Justify your reasoning.
- Choose a new reporter to be prepared to share out for your group.

What skills do employers value most?

Math Content Module 1, Session 1
Grades 6–9

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Session 1 reflection

Identify one connection between the sample EngageNY problems and the components of rigor.

What does it look like when we ask students to work on procedural skill and fluency versus conceptual understanding or application?

Math Content Module 1, Session 1
Grades 6–9

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MATHEMATICS CONTENT MODULES

Module 1: Setting the foundation for implementing the curriculum

Session 2: Focus and coherence of the LSSM

Grades 6–9

Focus and coherence of the LSSM

The Louisiana Student Standards for Mathematics is structured around essential instructional shifts:

Shift 1: Focus

Shift 2: Coherence

Math Content Module 1, Session 2
Grades 6–9

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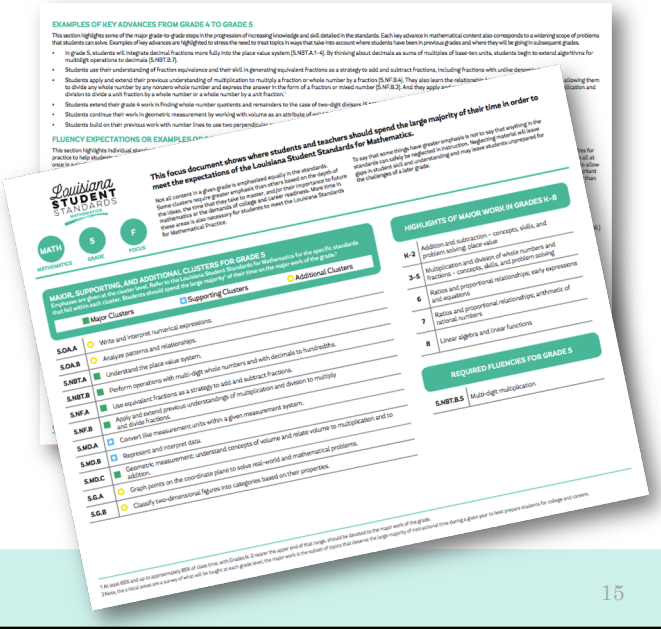
Focus on the major work of the grade

Take a few minutes to familiarize yourself with the Focus documents.

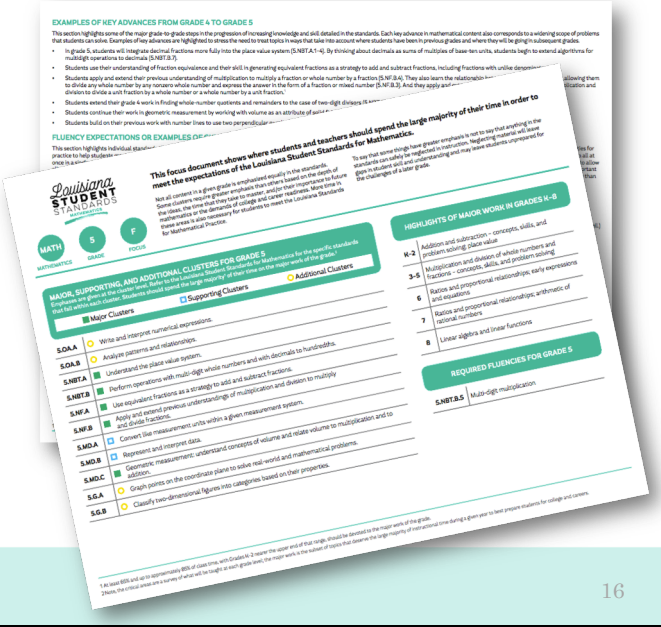
- How would you summarize the *major work* of your grade?
- Is there anything that you thought should be a part of your grade's major work that is not?
- How do the supporting and additional clusters support the major work in your grade?

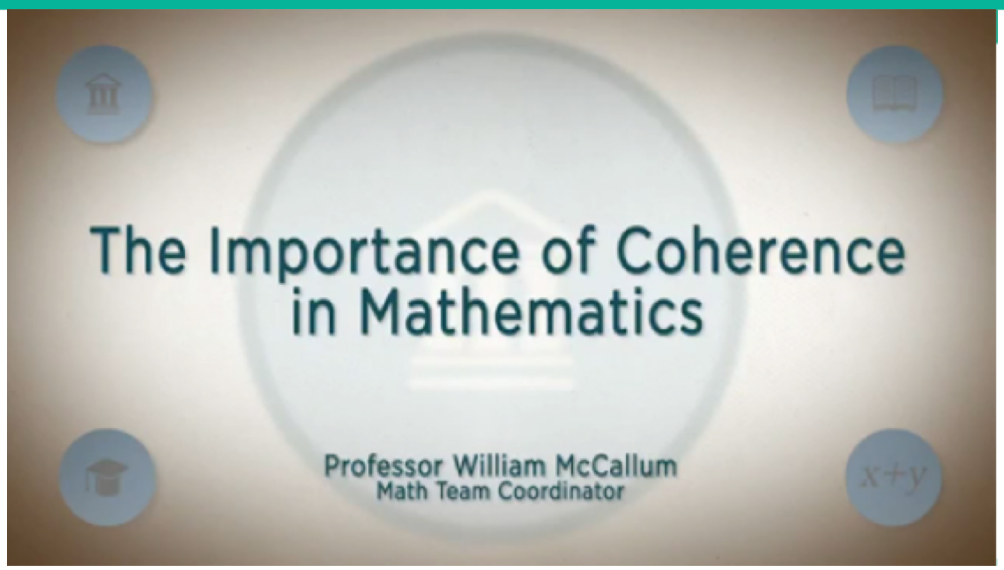


Focus on the major work of the grade

Take a few minutes to familiarize yourself with the Focus documents.

- What additional information can be found on this document and why is it important?





Math Content Module 1, Session 2
Grades 6–9

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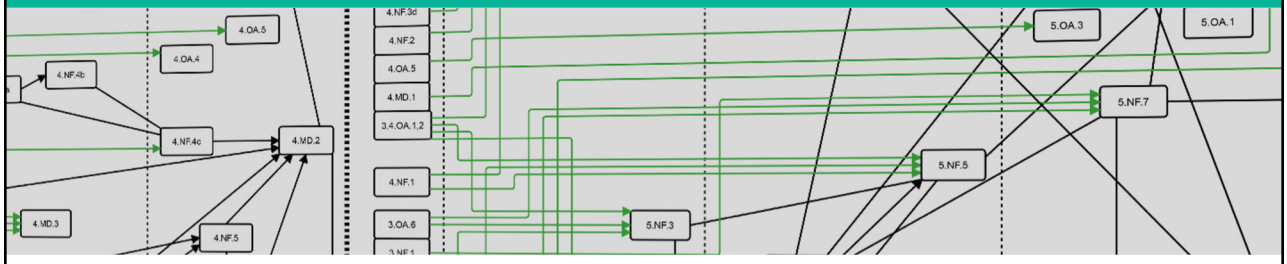
https://achievethecore.org/page/2801/learn-more-about-the-coherence-map

Coherence Map



- Build student understanding by linking together concepts within and across grades.
- Identify gaps in a student's knowledge by tracing a standard back through its logical pre-requisites.
- Visualize and understand how supporting standards relate to the major work of the grade.

https://achievethecore.org/coherence-map/

Math Content Module 1, Session 2
Grades 6–9

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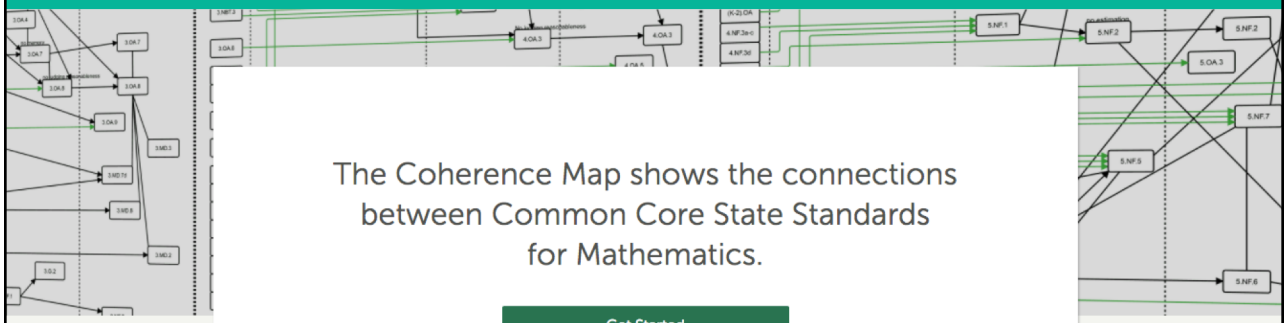
Coherence Map



The Coherence Map shows the connections between Common Core State Standards for Mathematics.

Get Started

Build student understanding by linking together concepts within and across grades.

Identify gaps in a student's knowledge by tracing a standard back through its logical pre-requisites.

Visualize and understand how supporting standards relate to the major work of the grade.

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Coherence Map

Kindergarten

1st Grade

2nd Grade

3rd Grade

4th Grade

5th Grade

6th Grade

7th Grade

8th Grade

Math Content Module 1, Session 2
Grades 6–9

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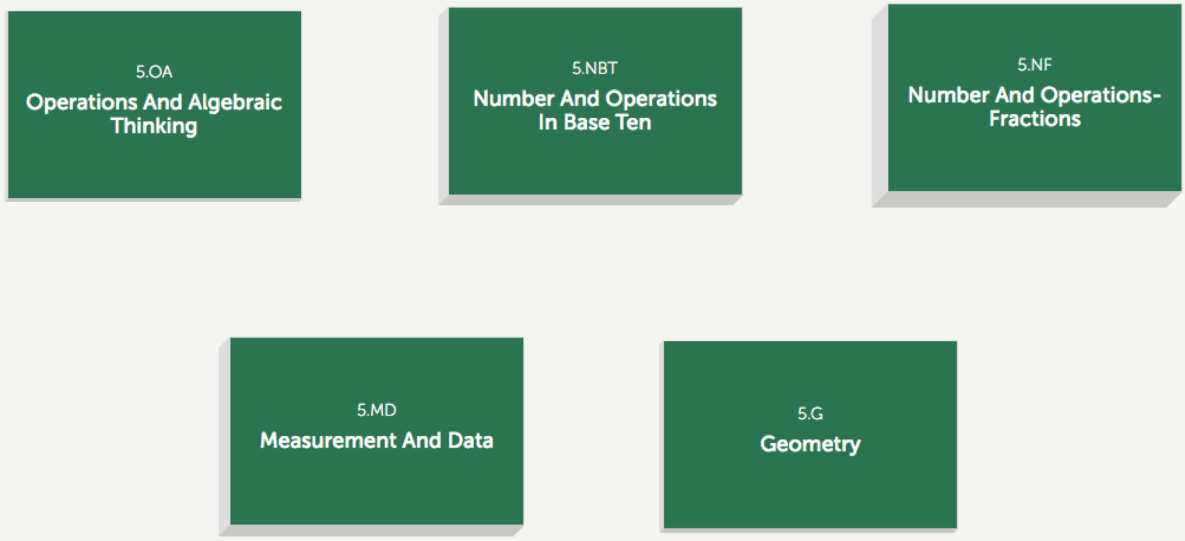
Coherence Map



Math Content Module 1, Session 2
Grades 6–9

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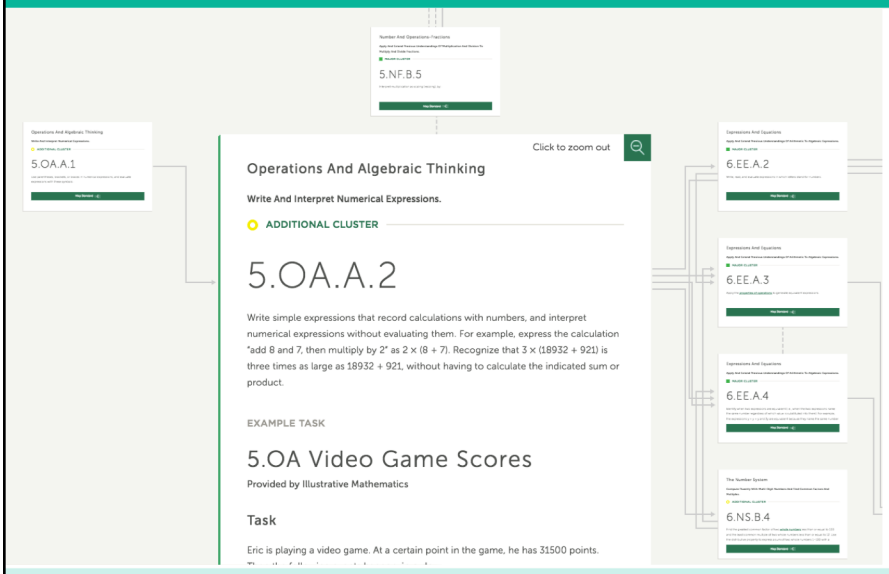
Coherence Map



Arrows

An arrow (A->B) indicates related standards in cases where a student who cannot meet A is not likely to be able to meet B.

Dashed Lines

A dashed line (A---B) indicates related standards.

Math Content Module 1, Session 2
Grades 6–9

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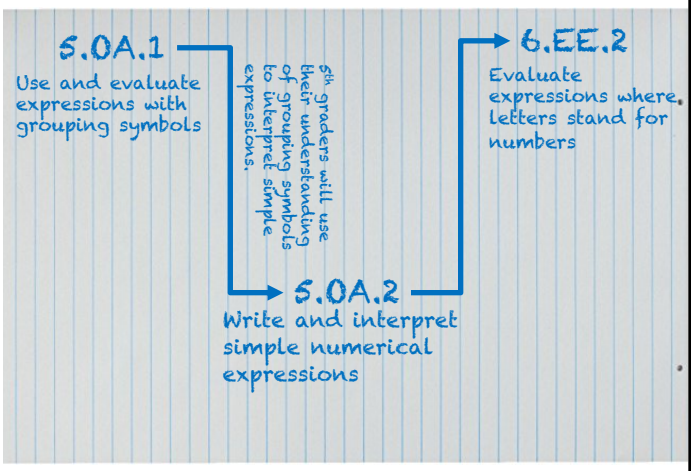
Coherence Map

Take a few minutes to familiarize yourself with the Coherence Map.

On your chart paper:

1. Write your grade-level standard code in the center.
2. Summarize the standard.
3. Identify at least 3 related standards and summarize them.
4. Describe how the standards are related.



Session 2 reflection

Points to ponder

- How could knowing the related standard(s) affect teaching and learning in your classroom?
- How might you approach teaching the standards differently, knowing that they are supporting the major work of the grades?

Louisiana Remediation Guides

DEPARTMENT of EDUCATION
louisiana Believes

Louisiana STUDENT STANDARDS MATHEMATICS

6th Grade Remediation Guide

Focused remediation helps target the skills students need to more quickly access and practice on-grade level content. This chart is a reference guide for teachers to help them more quickly identify the specific remedial standards necessary for every Grade 6 math standard. Students should spend the large majority of their time on the major work of the grade (■). Supporting work (■) and, where appropriate, additional work (■) can engage students in the major work of the grade.

6th Grade Standard	Previous Grade(s) Standards	6th Grade Standards Taught in Advance	6th Grade Standards Taught Concurrently
6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."*	4.OA.A.2 Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison (Example: 6 times as many vs. 6 more than). 4.MD.A.1 Know relative sizes of measurement units within one system of units including: ft, in; km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. (Conversions are limited to one-step conversions.) Record measurement equivalents in a two-column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...* 5.OA.B.3 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.* 5.NF.B.3 Interpret multiplication as scaling (resizing). a. Comparing the size of a product to the size of one		

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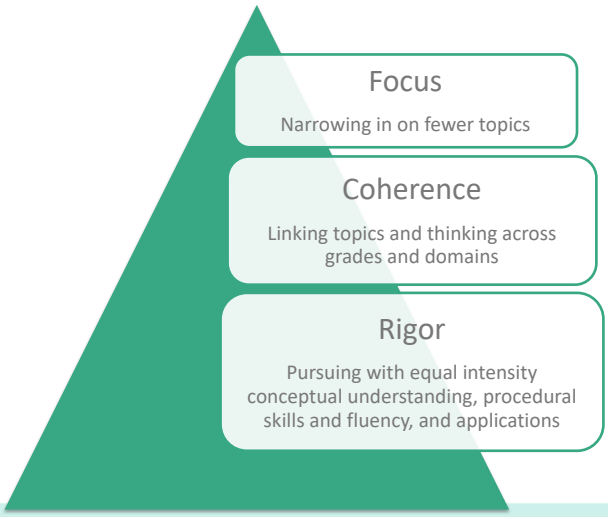
MATHEMATICS CONTENT MODULES

Module 1: Setting the foundation for implementing the curriculum

Session 3: Key Shifts in Action Through an EngageNY Lesson

Grades 6–9

Key shifts of the LSSM



Math Content Module 1, Session 3
Grades 6–9

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Evidence of the key shifts

Use the handout to:

- Check off student behaviors/actions that you observed.
- Record any observations you made that serve as evidence.

Looking for Evidence of Student Engagement in the Key Shifts

Focus	Evidence
☐ The learning goal(s) of the lesson supports grade level standard(s).	
Coherence	
☐ The lesson intentionally relates new concepts to students' prior skills and knowledge. ☐ Students set the foundation for future learning. ☐ Students access prior learning from major work in the grade in order to support new learning.	
Rigor	
Conceptual Understanding ☐ Students access concepts and ideas from a variety of perspectives. ☐ Students explain mathematical ideas behind a particular concept in a variety of ways. ☐ Students use examples and counterexamples to make and support conjectures applied to one problem to multiple situations. ☐ Students create and use a variety of models to analyze relationships. ☐ Students make use of patterns and structure to compose and decompose numbers, shapes, expressions, and equations. **Procedural Skills and Fluency** ☐ Students select tools (e.g. physical objects, manipulatives, drawings, diagrams, algorithms, or strategies) that are relevant and useful for the task or problem. ☐ Students communicate thinking using appropriate vocabulary, symbols and/or units in precise and accurate ways. ☐ Students look for patterns, generalizations, and shortcuts. ☐ Students are flexible in their use of procedures and skills to solve problems. **Application** ☐ Students decontextualize and contextualize quantities in problem situations. ☐ Students plan and choose a solution pathway when applying their mathematical knowledge to different situations.	

Note: To help educators look for evidence of grade-level-appropriate student engagement in mathematical tasks, these narrative descriptors are adapted from Illustrative Mathematics. (2014, February 12). *Standards for Mathematical Practice: Commentary and Elaborations for K-5 and 6-8*. Tucson, AZ. Available at http://commoncoretools.me/2014/02/12/k-5-elaborations-of-the-practice-standards

Math Content Module 1, Session 3
Grades 6–9

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Learning expectations

The student will:

Graph proportional relationships, interpreting the unit rate as the slope of the graph.

Use examples and counterexamples to communicate thinking, using appropriate vocabulary, symbols, and/or units.

Engaging in the math

Pauline mows a lawn at a constant rate. She mows a 35-square-foot lawn in 2.5 minutes.

- What do you know?
- What do you want to know?
- What might the question be?

Engaging in the math

What area, in square feet, can she mow in 10 minutes?

Choose one:

- Represent your answer in at least two different ways.
- Write two different ratios for this situation.

Engaging in the math

How might we express Pauline's average rate for any number of minutes?

Let y represent the number of square feet and t represent the number minutes.

Talking about the math

Average Rate

Constant Rate

What is the same?

What is different?

Engaging in the math – Practice with a partner

For exercise 1:

Partner A	Partner B
Create a TABLE for the situation.	Create a GRAPH for the situation.

Once you are both done, compare your table and graph. Then, turn and talk with your partner to discuss:

- What values did you use to generate your graph or table? Why?
- Where do you see the constant rate in each of the representations?

Engaging in the math

Exercise 1:

Juan types at a constant rate. He can type a full page of text in 3½ minutes.

Engaging in the math

Exercise 1:

What linear equation can represent the number of pages typed in any given time interval? (Let *p* represent number of pages typed and *t* represent time in minutes.)

Engaging in the math – Closing the lesson

Essential Characteristics	Application
CONSTANT RATE OF CHANGE	
Example	Non-Example

Evidence of the key shifts

Use the handout to:

- Check off student behaviors/actions that you observed.
- Record any observations you made that serve as evidence.

Looking for Evidence of Student Engagement in the Key Shifts

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Rigor	
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Evidence of the key shifts

Corner A:
Coherence

Corner C:
Conceptual Understanding

Evidence of the Key Shifts

Corner B:
Procedural Skills and Fluency

Corner D:
Application

Math Content Module 1, Session 3
Grades 6–9

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MATHEMATICS CONTENT MODULES

Module 1: Setting the foundation for implementing the Tier 1 curriculum

Session 4: Exploring the EngageNY Curriculum

Grades 6–9

What is alignment?

Alignment is more than…

- A chart
- A textbook correlation
- A scope and sequence
- A curriculum guide
- A testing plan

These imply alignment, but they do not achieve alignment.

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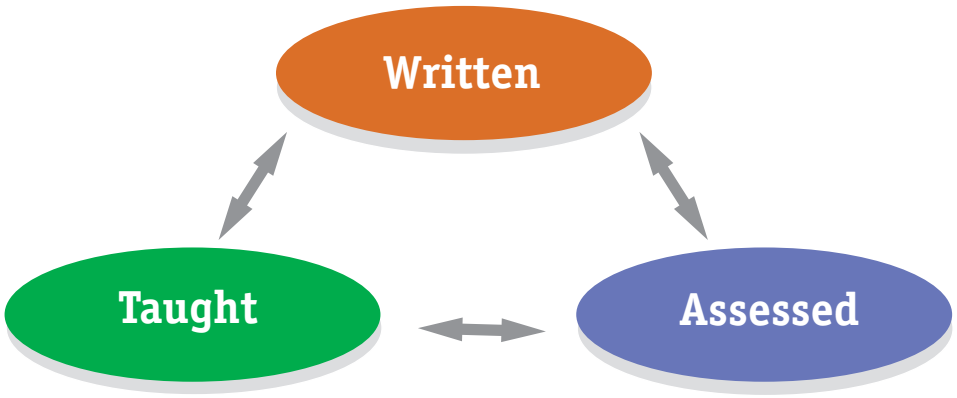
What is alignment?



(English, 2010)
Adapted from the work of Fenwick English

Math Content Module 1, Session 4
Grades 6–9

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What is alignment?

Alignment means ***EVERY*** educator…

- Understands what is expected of students.
- Understands these expectations within the context of the K–12 program.
- Accepts responsibility for meeting these expectations.

Math Content Module 1, Session 4
Grades 6–9

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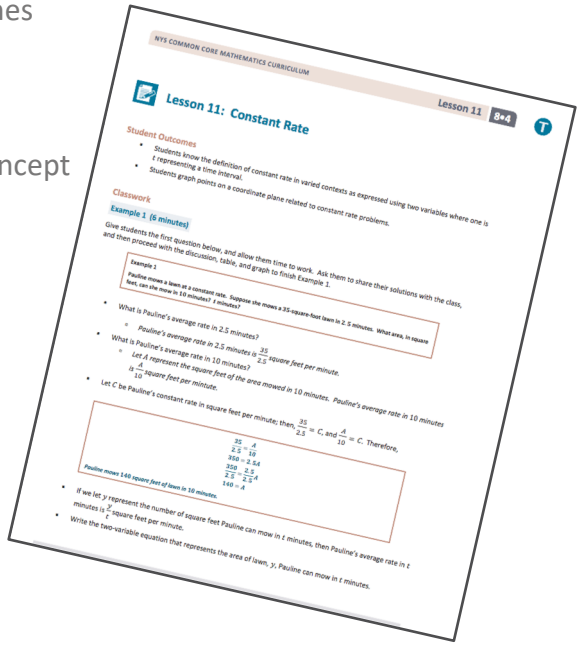
What are the main components of the EngageNY curriculum resource?

What is the purpose of each component?

- Student Outcomes
- Materials
- Classwork or Concept Development
- Exercises
- Closing
- Exit Ticket
- Problem Set



NYS COMMON CORE MATHEMATICS CURRICULUM

Lesson 11 8•4 T

Lesson 11: Constant Rate

Student Outcomes

- Students know the definition of constant rate in varied contexts as expressed using two variables where one is t representing a time interval.
- Students graph points on a coordinate plane related to constant rate problems.

Classwork

Example 1 (6 minutes)

Give students the first question below, and allow them time to work. Ask them to share their solutions with the class, and then proceed with the discussion, table, and graph to finish Example 1.

> **Example 1**
>
> **Pauline mows a lawn at a constant rate. Suppose she mows a 35-square-foot lawn in 2.5 minutes. What area, in square feet, can she mow in 10 minutes? t minutes?**

- What is Pauline's average rate in 2.5 minutes?
  - *Pauline's average rate in 2.5 minutes is $\frac{35}{2.5}$ square feet per minute.*
- What is Pauline's average rate in 10 minutes?
  - *Let A represent the square feet of the area mowed in 10 minutes. Pauline's average rate in 10 minutes is $\frac{A}{10}$ square feet per minute.*
- Let C be Pauline's constant rate in square feet per minute; then $\frac{35}{2.5} = C$, and $\frac{A}{10} = C$. Therefore,

$$\frac{35}{2.5} = \frac{A}{10}$$
$$\frac{350}{2.5} = \frac{2.5A}{2.5}$$
$$140 = A$$

> *Pauline mows 140 square feet of lawn in 10 minutes.*

- If we let y represent the number of square feet Pauline can mow in t minutes, then Pauline's average rate in t minutes is $\frac{y}{t}$ square feet per minute.
- Write the two-variable equation that represents the area of lawn, y, Pauline can mow in t minutes.

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Unpacking the EngageNY lesson

8.EE.B.5

Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*

Math Content Module 1, Session 4
Grades 6–9

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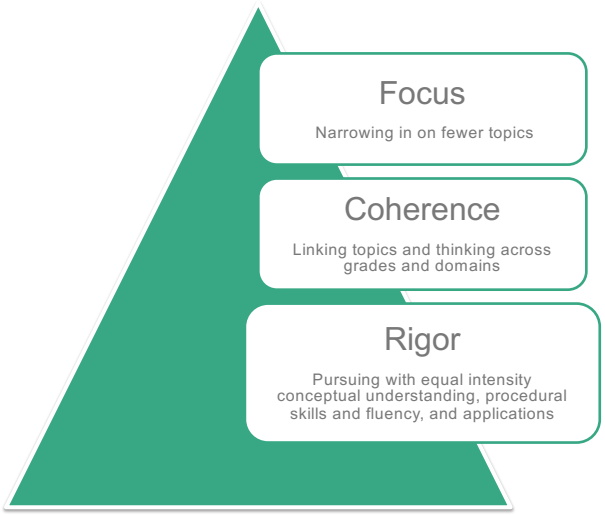
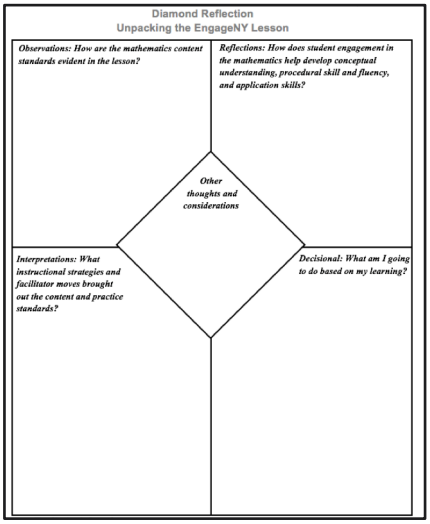
Evidence of the key shifts





Math Content Module 1, Session 4
Grades 6–9

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Session 4 reflection

Personal reflection

- How will unpacking EngageNY lessons for the standards and key shifts affect your planning and instruction?
- As a result of your learning in Sessions 3 and 4, identify one *action* you will take to effectively plan for instruction.

MATHEMATICS CONTENT MODULES

Module 1: Setting the foundation for implementing the curriculum

Session 5: Classroom culture

Grades 6–9

"When students realize they can succeed in mathematics, they are transformed – you can see them raise their aspirations for school and life."

— Uri Treisman

University Distinguished Teaching Professor,
Professor of Mathematics, Professor of Public Affairs, and
Executive Director, The Charles A. Dana Center at
The University of Texas at Austin

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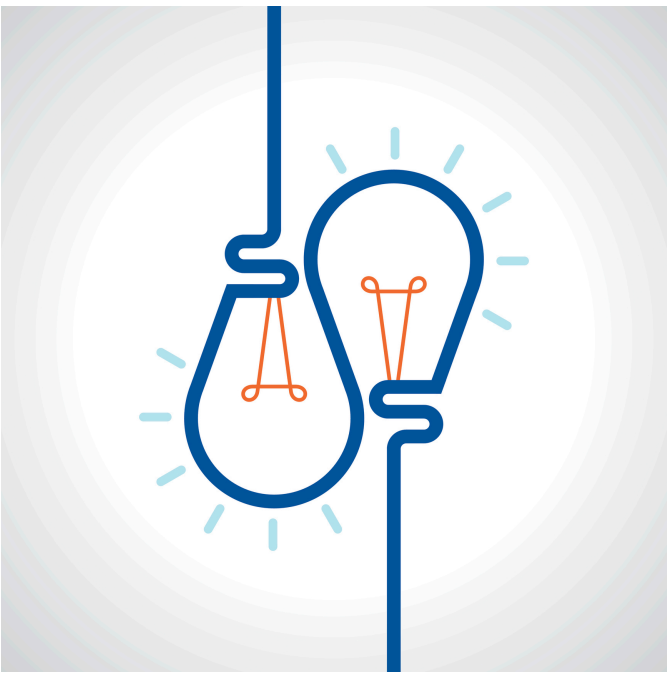
Quiz



ARTQUI/iStock/Thinkstock

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Fixed versus malleable intelligence

Read Dweck's article, "The Perils and Promises of Praise," and consider the following:

What confirms your current knowledge and beliefs?

What questions does this research raise for you?

(Dweck, 2007)

Fixed versus malleable intelligence

Consequences of students who view intelligence as **fixed**	Consequences of students who view intelligence as **malleable**

Supporting a growth mindset

- Provide opportunities for collaboration and discourse.
- Encourage high, equitable levels of student participation.
- Encourage a broad range of competencies/approaches.
- Promote cooperative learning and shared accountability.
- Provide autonomy/choice in task, team, and processes.
- Model and monitor the climate for interactions among students.

Math Content Module 1, Session 5
Grades 6–9
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What are the implications?

Based on your reading and discussion:

- How might this research inform the ways in which you interact with and teach your students?
- How might this research impact the culture of learning in your classroom?

Math Content Module 1, Session 5
Grades 6–9
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What to expect in Modules 2–6

- **Deepening Mathematical Content Knowledge** for effective instruction
- **Exploring Coherence** in the LSSM
- **Key Shifts in Action** through an EngageNY lesson
- **Promoting Rigor** in the classroom
- **Instructional Strategies** for implementing the EngageNY curriculum
- The role of a **Productive Classroom Culture** in the EngageNY curriculum
- **Purposeful Planning** of the EngageNY curriculum

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Math Content Module 1, Session 5
Grades 6–9

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Module evaluation

Your feedback and comments are important to us. Please complete the module evaluation found at:

http://www.utdanacenter.org/ldoe/surveys

Math Content Module 1, Session 5
Grades 6–9

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